

REMARKS

This communication is responsive to the Final Office Action dated May 23, 2006. Claims 1, 4, 13 and 15 remain pending in the application without amendment. Applicant respectfully requests reconsideration of the pending claims in light of the following remarks.

Claims 1, 4, 13 and 15 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 6,383,873 to Hegde et al. ("Hegde"). This rejection is traversed.

Claim 1 recites: *[a] semiconductor device comprising:*

a semiconductor substrate;
a gate insulating film on the semiconductor substrate; and
a gate electrode formed on the gate insulating film and including at least a p-type impurity-contained layer, wherein the p-type impurity layer is a boron-contained silicon layer;
wherein the gate insulating film includes a high-dielectric-constant film and a nitride layer on the high-dielectric-constant film, wherein the high-dielectric constant film is composed of Al₂O₃ having a thickness of approximately 2.5 nm, and the nitride layer is formed by introducing nitrogen into a top surface portion of the high-dielectric-constant film to have a thickness of 0.2 to 0.3 nm, and wherein introducing nitrogen into the top surface portion comprises introducing nitrogen gas at 300-400 sccm, for approximately 20-60 seconds, at approximately 10-100 mTorr; and
a lightly doped drain structure formed by a first introduction of boron to the substrate, a formation of a sidewall spacer adjacent to the gate electrode, and a second introduction of boron to the substrate to form source and drain regions.

These claimed features are neither disclosed nor suggested by Hegde. Hegde discloses a process for forming a structure (100) that includes a semiconductive region (102), a first oxide layer (106), a second oxide layer (108) and a conductive layer (110).

Applicant concurs with the Examiner's conclusion that Hegde does not disclose the introduction of boron to the substrate to form an LDD structure, and a second introduction of boron to the substrate to form source and drain regions as claimed by Applicant. However, Applicant does not agree with the Examiner's conclusion that such features are obvious in the

claimed context.

Nevertheless, Applicant respectfully notes that there are other claimed features that are clearly absent from Hegde. For example, there is no disclosure or suggestion of a *gate insulating film [that] includes a high-dielectric-constant film and a nitride layer on the high-dielectric-constant film, wherein the high-dielectric constant film is composed of Al_2O_3 having a thickness of approximately 2.5 nm* as claimed.

The Examiner alleges that layer 106 of Hegde discloses this features, including composing the layer of Al_2O_3 . In that regard, the Examiner references col. 2, line 50 of Hegde. However, this passage merely refers to a *TaAlON* material for the first oxide layer 106, a different material from that claimed by Applicant. Moreover, the only particular disclosure of materials for this layer teaches away from Applicant's claimed invention. Hegde not only fails to state Aluminum in listing suitable metals, but also states that Group IIIA, IVA, and VA elements are the suitable metals for use as the first element of the oxide layer 106. (See col. 2, lines 28-34). Aluminum is not in this Group of elements. Accordingly, there is no disclosure nor is there any suggestion of the particular composition claimed by Applicant. Further, the reference to the thickness of the first oxide layer in Hegde is provided in the context of different materials from that material claimed by Applicant, and thus may not fairly be concluded as disclosing an Al_2O_3 layer having such a thickness.

Hegde also does not disclose a *nitride layer is formed ... to have a thickness of 0.2 to 0.3 nm* as claimed by Applicant. The Examiner alleges that layer 108 discloses this layer, and references column 3, line 58 as evidencing the claimed thickness. However, the noted film (108) is actually silicon oxide. Even though nitrogen may be introduced in the ambient, and some nitridation of the silicon oxide layer may occur, there is no disclosure or suggestion of the particular nitride layer thickness claimed by Applicant. The fact that the silicon oxide layer 108 is described as being "less than approximately 0.9 nm" does not in any way evidence a conclusion that a nitride layer having a thickness of 0.2 to 0.3 nm is disclosed by Hegde.

For reasons similar to those provided regarding claim 1, claim 13 is also neither disclosed nor suggested by Hegde, nor are dependent claims 4 and 15, which incorporate the features recited therein.

Accordingly, since various features of Applicant's claimed invention are neither disclosed nor suggested by Hegde, Applicant respectfully requests reconsideration and withdrawal of the rejection of the claims as being unpatentable over the reference under 35 U.S.C. § 103(a).

For the foregoing reasons, reconsideration and allowance of the claims which remain in this application are solicited. If any further issues remain, the Examiner is invited to telephone Christopher M. Tobin at (202) 955-8779, or any of the undersigned at the provided number to resolve them.

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Respectfully submitted,

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